

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Manifestation of Particle Morphology on the Mechanical Response of a Granular Ensemble TEJAS MURTHY, RAMESH KANDASAMI, Indian Institute of Science — We present the effect of particle morphology (grain shape) on the mechanical response of granular materials at an ensemble level. We chose two model systems with extreme differences in morphology, i.e. spherical glass ballotini and angular sand in our experimental programme. We conducted a series of continuum elemental tests under these model materials reconstituted to the same packing. We arrive at the failure locus on the octahedral plane experimentally for these two systems. The ballotini shows increased dilation at the outset of the test, however, at large strains, the particle rearrangement in the angular sand and the increased interlocking leads to higher strength. The effect of individual particle morphology is manifested in both the increased friction angle and a larger sized failure locus in stress space with increase in angularity. The stresses developed in these two model materials are also accompanied by intriguing volume change behaviour. The glass ballotini despite a lower strength presents a predominantly dilative response while the angular sand shows showing a contractive response. Such an ensemble manifestation of individual particle morphology is useful in interpreting the extensive DEM simulations that are available in literature.

Tejas Murthy
Indian Institute of Science

Date submitted: 11 Nov 2016

Electronic form version 1.4